

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A method of deriving a function for classifying items of currency, the method comprising:

processing training data vectors corresponding to features of a plurality of currency items,

forming a subset of training data vectors used as a basis to reconstruct input space vectors in a feature space,

and subsequently deriving a support vector machine classification function involving a plurality of support vectors from reconstructed training data vectors and

storing the support vector machine classification function in a currency validator processing system,

wherein the support vector machine classification function is applied by the currency validator processing system to received items of currency.

2. (Canceled)

3. (Currently amended) A method as claimed in claim 1 wherein the support vector machine classification function is in the form $g(x) = x^T \sum_{i \in SVS} \alpha_{O,i} d_i x_i + b_0$

4. (Currently amended) A method as claimed in claim 1, wherein forming the subset of training data vectors comprises selecting training data vectors such that an image of the subset of training

data vectors is representative of an image of the training data in the first space, wherein the first space corresponds to a kernel mapping of a second space corresponding to the space of input data.

~~the support vector machine classification function involves a kernel function corresponding to a mapping of a first space corresponding to the space of input data to a second space, and determining a subset of the training data vectors whose image in the second space is representative of the image of the training data in the second space, wherein the support vector machine classification function is expressed in terms of said subset.~~

5. (Currently amended) A method as claimed in claim 4 wherein the subset is such that the image of each element of the training data vectors is set can be expressed approximately as a linear combination of the image of elements of the subset.

6. (Original) A method as claimed in claim 5 wherein the subset is such that a measurement of the approximation meets a predetermined condition.

7. (Currently amended) A method as claimed in claim 4 comprising: wherein selecting a subset comprises:

- (a) deriving a temporary subset;
- (b) calculating the value of a fitness function representing the closeness of an approximation of the image of the remaining elements of the data set in terms of the image of the temporary subset;
- (c) deriving another temporary subset and repeating (b); and
- (d) comparing the values of the fitness function for each temporary subset, and selecting the temporary subset for which the value of the fitness function indicates the closest approximation.

8. (Previously presented) A method as claimed in claim 7 in which (a) to (d) are repeated to form

a sequence of temporary subsets of increasing or decreasing size.

9. (Previously presented) A method as claimed in claim 7 wherein (a) to (d) are repeated until a predetermined condition is met.

10. (Currently amended) A method as claimed in claim 8 wherein the fitness function uses the kernel mapping, function

11. (Currently amended) A method as claimed in claim 4 wherein the support vector machine classification function is in the form $g(\mathbf{x}_i) = \sum_{j=1}^L w_{z0,j} k(\mathbf{x}_j, \mathbf{x}_i) + b_0$.

12. (Currently amended) A method as claimed in claim 1 comprising deriving a plurality of measurements from at least one currency sensor and a plurality of currency items, and forming the training data vectors set from the measurements.

13. (Currently amended) A method as claimed in claim 1 wherein individual elements of the data set comprise a plurality of measurements corresponding to a plurality of characteristics of [[the]] sensed items.

14. (Previously presented) A method as claimed in claim 12 wherein the currency sensor comprises a document sensor.

15. (Previously presented) A method as claimed in claim 14 wherein the document sensor comprises a banknote sensor.

16. (Previously presented) A method as claimed in claim 12 wherein the currency sensor comprises a coin sensor.

17. (Previously presented) A method as claimed in claim 4 wherein the kernel mapping function is a Gaussian, polynomial, sigmoid, hyperbolic tangent or spline kernel.

18. (Canceled)

19. (Currently amended) A currency validator storing a classification function in the form of a support vector machine derived by a method comprising:

processing training data vectors corresponding to features of a plurality of currency items;

forming a subset of training data vectors used as a basis to reconstruct input space vectors in a feature space; and

subsequently deriving a support vector machine classification function involving a plurality of support vectors from the reconstructed training data vectors. involving constants representing at least a kernel function, a weight, and a set of support vectors, or a subset of support vectors representing data under the image of a mapping corresponding to the kernel function

20. (Previously presented) A method as claimed in claim 22 wherein the classification function is

in the form of either $g(x) = x^T \sum_{i \in SVs} \alpha_{o,i} d_i x_i$ or $g(\mathbf{x}_i) = \sum_{j=1}^L w_{z0,j} k(x_j, x_i) + b_0$.

21. (Canceled)

22. (Currently amended) A method of classifying a currency item in a currency classifier comprising deriving at least one measurement of the currency item from at least one currency sensor, classifying the currency item using a classification function, wherein the classification function comprises a support vector machine derived by a method comprising:

processing training data vectors corresponding to features of a plurality of currency items;

forming a subset of training data vectors used as a basis to reconstruct any vector in a feature space; and

subsequently deriving a support vector machine classification function involving a plurality of support vectors from the reconstructed training data vectors. involving constants representing at least a kernel function, a weight, and a set of support vectors, or a subset of support vectors representing data under the image of a mapping corresponding to the kernel function.

23. (Currently amended) A validator comprising

means for sensing currency items to produce measured values representing characteristics of the items,

means storing a function, and

means for validating a currency item using the measured values and the function,

wherein the function comprises a support vector machine derived by a method comprising:

processing training data vectors corresponding to features of a plurality of currency items;

forming a subset of training data vectors used as a basis to reconstruct any vector in a feature space; and

subsequently deriving a support vector machine classification function involving a plurality of support vectors from the reconstructed training data vectors. involving constants representing at least a kernel function, a weight, and a set of support vectors, or a subset of support vectors representing data under the image of a mapping corresponding to the kernel function.

24. (Previously presented) A validator as claimed in claim 23, wherein the function is in the

form of either $g(x) = x^T \sum_{i \in SVS} \alpha_{0,i} d_i x_i$ or $g(x_i) = \sum_{j=1}^L w_{z0,j} k(x_j, x_i) + b_0$.

25. (Previously presented) A method as claimed in claim 9 wherein (a) to (d) are repeated until a fitness function meets a predetermined condition, wherein the predetermined condition includes at least one of the following conditions:

- (i) a value of the fitness function is less than or equal to a predetermined value;
- (ii) a value of the fitness function is greater than or equal to a predetermined value;
- (iii) a subset is of a predetermined size; or
- (iv) $K_{s,s}$ is no longer numerically invertible.

26. (New) A method as claimed in claim 1 further comprising using the support vector machine classification function to classify an item of currency in the currency validator processing system.